

MINING

Project Fact Sheet



MINING BY-PRODUCT RECOVERY

BENEFITS

- Increases energy savings by increasing the production of commodity metals
- Increases revenues by selling products that would otherwise be disposed of as waste
- Decreases waste by allowing it to be reclassified in a low-risk, inexpensive disposal category
- Increases industry competitiveness by turning potential waste into a product

APPLICATION

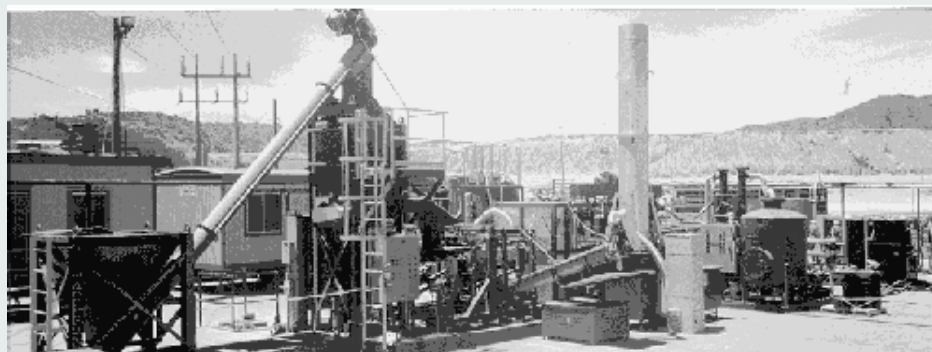
This new technology can be used to recover commodity metals from process residues that are contaminated with trace metals.

TECHNOLOGY SEPARATES MERCURY FROM PROCESS RESIDUE-- VALUABLE METALS RECOVERED

Mining by-product recovery allows valuable metals to be recovered from mining residue, potentially returning millions in revenue to the mining industry. This project is developing a process that separates mercury from process residue allowing valuable lead, gold, and silver to be recovered. This project also is identifying sites where this process could be used to produce mine revenue.

The process uses an innovative technology, rotary vacuum drying, to process mining residues. The high vacuum and high temperature system has the following advantages over previous thermal processes: (1) kinetics and thermodynamic experimental results and modeling show that separation of mercury under vacuum reduces formation of mercury compounds (e.g., HgSO_4 , HgSe) and improves recovery of elemental mercury; (2) easier to site and regulate because material is recovered rather than disposed; (3) because of the operating vacuum, products of incomplete combustion, such as dioxin and furane, do not form; (4) complex off-gas treatment systems are not needed, making the process compact while reducing capital and maintenance costs; (5) metals are recovered that could have been disposed of as waste; (6) there is minimal dusting and particulate formation; and (7) residues are processed as acids rather than neutralized, reducing the mass of inert material. This process increases mine production because more commodities are produced per ton of mined material. Additional economic benefits result from pollution prevention and avoidance of the associated environmental management cost -- such as disposal, compliance, worker exposure, equipment, training, health benefits, and liability costs.

BY-PRODUCT RECOVERY



Innovative process operates at a copper mine.



Project Description

Objective: To implement a by-product recovery process to increase the amount of product generated per ton of mined material and to reduce the amount of waste and toxic materials generated by mining processing activities. This project will also analyze the economics of this separations technology. It is expected to have wide applicability for recovery of numerous by-product minerals.

A small U.S. business has patented this radical technology breakthrough that is significantly advancing by-product utilization by recovering metals from mine process residue. These marketable metals are separated on-site with compact processing equipment. The heart of the patented process is an indirectly heated rotary kiln that operates in a high vacuum and at a high temperature. These conditions produce the ideal environment to volatilize organic compounds, water, and low to moderate boiling point metals such as mercury, arsenic, selenium, and cadmium. Since air is eliminated from the kiln, combustion does not occur and off-gas equipment is minimized.

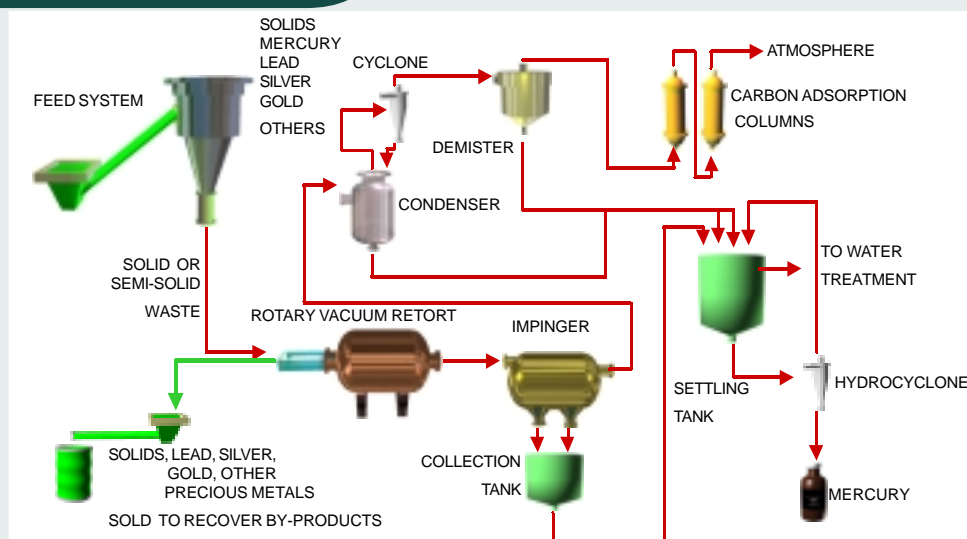
The U.S. mining industry produces over 7,000,000 ton/year of process residue that may contain hazardous species as well as valuable by-products. Process residues are generated by (a) smelter off-gas cleaning (b) bag house dust and wastewater treatment. Mercury could be separated for these process residues to allow the recovery of residual metals. These metals could be sold as by-products, generating revenue for the mining industry.

Progress and Milestones

This project includes the following activities:

- Establish benefits to the mining industry from recovery of by-products from process residue, concentrating on smelter acid plant process residue.
- Compile and analyze data on process residue to target by-product recovery research and development.
- Model what by-products the SepraDyne process can recover under current and predicted operating conditions.
- Complete experiments on the interaction, in vacuum conditions, of gaseous mercury with other species present in smelter acid plant process residue (i.e., sulfur, selenium).

HIGH TEMPERATURE VACUUM RETORT SYSTEM



Innovative process separates mercury from valuable commodity metals



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